COMPARISON STUDY OF BERYLLIUM AND LITHIUM TARGET SYSTEM FOR BEAM SHAPING ASSEMBLY USED IN BORON NEUTRON CAPTURE THERAPY

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ABSTRACT

Boron neutron capture therapy (BNCT) is a selective targeting cancer therapy method that worked by radiating epithermal neutron beams to a tumor which has been injected by boron-10 compound. For this method to work there are two key elements, first the boron-10 compound and second the irradiating neutron beam used must be at epithermal energy level. The neutron source used in this research is 13 MeV 1mA cyclotron that is still being developed by Indonesia National Nuclear Energy Agency. This paper focuses in beam shaping assembly (BSA) target system. BSA target system is used to convert the proton produced from cyclotron into neutron. IAEA produces a recommendation for BNCT neutron beam quality, one of them is epithermal neutron flux that is higher than $10^9\ n/cm^2$*. To fulfill this requirement it is absolutely crucial that the neutron flux in the target system produces the highest neutron flux possible before moderation. In this paper simulation is conducted to find the best target system and thickness for cyclotron 13 MeV that can produce the highest neutron flux before moderation using MCNPX. From the simulation beryllium produces higher neutron flux compared to lithium. Beryllium neutron flux peaks at 1250 μm with neutron flux of 4.87E+12* n/cm^2 *and lithium neutron flux peaks at 4000 μm with flux 3.53E+12* n/cm^2*.*

Keywords: bnct, cyclotron, beam shaping assembly, target, mcnpx